IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

APPLIED SCIENCE AND TECHNOLOGY, INC.,	:	
Plaintiff,	:	
v.	:	Civil Action No. 00-1004 JJF
ADVANCED ENERGY INDUSTRIES, INC.,	:	
Defendant.	:	

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MEMORANDUM OPINION

April 26, 2002
Wilmington, Delaware

FARNAN, District Judge.

Plaintiff, MKS Instruments, Inc. and Applied Science and Technology, Inc. (collectively "MKS") filed this action against Defendant, Advanced Energy Industries, Inc. ("Advanced Energy") alleging infringement of United States Patent No. 6,150,628 (the "'628 Patent"). The issue currently before the Court is the claim construction of the '628 Patent. The parties briefed their respective positions on claim construction, and the Court held a Markman hearing on December 7, 2001. This Memorandum Opinion presents the Court's construction of the disputed terms in the '628 Patent.

BACKGROUND

The '628 Patent, entitled "Toroidal Low-Field Reactive Gas Source," discloses a system that uses a plasma to produce a reactive gas, to be used, principally, for cleaning the interior of semiconductor processing chambers. (D.I. 104, Ex. A). Specifically, the '628 Patent describes the use of AC switching power supplies to power transformer inductively coupled plasmas. Once a plasma is created, a reactive gas is fed into the plasma chamber where the electrons in the plasma collide with the molecules of the gas to dissociate the reactive gas into chemically active gases. These chemically active gases are then fed into the process chamber, which is coupled to the plasma

chamber, where the chemically active gas cleans the process chamber.

The parties dispute multiple terms and phrases of the '628 Patent; the Court will address each in turn.

DISCUSSION

I. The Legal Principals Of Claim Construction

Claim construction is a question of law. Markman v. Westview Instruments, Inc., 52 F.3d 967, 977-78 (Fed. Cir. 1995), aff'd, 517 U.S. 370, 388-90 (1996). When construing the claims of a patent, a court considers the literal language of the claim, the patent specification and the prosecution history. Markman, 52 F.3d at 979. A court may consider extrinsic evidence, including expert and inventor testimony, dictionaries, and learned treatises, in order to assist it in construing the true meaning of the language used in the patent. Id. at 979-80 (citations omitted). A court should interpret the language in a claim by applying the ordinary and accustomed meaning of the words in the claim. Envirotech Corp. v. Al George, Inc., 730 F.2d 753, 759 (Fed. Cir. 1984). However, if the patent inventor clearly supplies a different meaning, the claim should be interpreted accordingly. Markman, 52 F.3d at 980 (noting that patentee is free to be his own lexicographer, but emphasizing that any special definitions given to words must be clearly set forth in patent). If possible, claims should be construed to

uphold validity. In re Yamamoto, 740 F.2d 1569, 1571 & n.* (Fed. Cir. 1984) (citations omitted).

II. Construction of Disputed Terms

1) "AC Switching Power Supply"

MKS contends that the phrase "AC switching power supply" used throughout the '628 Patent means "an electrical power supply producing alternating current by the use of devices as switches." (D.I. 103 at 6). Advanced Energy contends that the phrase "AC switching power supply" means "a power supply that uses switching devices to produce an AC output without using an impedance matching network." (D.I. 110 at 32).

In construing the disputed phrase the Court has reviewed the patent specification and prosecution history. (D.I. 111 A9 col. 2 ln. 22-26, A12 col. 7 ln. 49-60, A13 col. 10 ln. 19-21, A121-22, 124, A169-70). Based on a review of these sources, the Court concludes that although the language of the claims might be broad enough to encompass an impedance matching network, the patent specification and prosecution history make it clear that the invention was not intended to encompass an impedance matching network. See SciMed Life Systems, Inc. v. Advanced Cardiovascular Systems, Inc., 242 F.3d 1337, 1345 (Fed. Cir. 2001); (D.I. 111 A9 col. 2 ln. 22-26, A12 col. 7 ln. 49-60, A13 col. 10 ln. 19-21, A121-22, 124, A169-70). Thus the Court concludes that "AC switching power supply" means a power supply

that uses switching devices to produce an AC output without using an impedance matching network.

2) "AC Power Supply"

MKS contends that the phrase "AC power supply" in claim 19 means "an electric power supply producing alternating current." (D.I. 103 at 31). MKS further contends that "AC power supply" is broader than "AC switching power supply" and to construe the phrases to be equivalent would render dependant claim 24 redundant. (D.I. 103 at 32). Advanced Energy contends that the phrase "AC power supply" is equivalent in meaning to the phrase "AC switching power supply." (D.I. 110 at 23-24). In support, Advanced Energy contends that MKS represented to the Patent and Trademark Office that "all pending apparatus claims include an AC switching power supply..." (D.I. 110 at 25, D.I. 111 A172). Thus, Advanced Energy contends that "AC power supply" means "AC switching power supply." (D.I. 110 at 32).

The doctrine of claim differentiation is well-established. When different words or phrases are used in separate claims, a difference in meaning and scope is presumed. See Comark Communications, Inc. v. Harris, 156 F.3d 1182, 1187 (Fed. Cir. 1998). Further, where there is a conflict between an attorney's remark during the prosecution of the patent application and the language of the claim, the language of the claims controls. See Intervet America, Inc. v. Kee-Vet Labs., Inc., 887 F.2d 1050,

1054 (Fed. Cir. 1989). Thus, because the Court finds that the language of the claim controls, the Court concludes that "AC power supply" is not equivalent in meaning to "AC switching power supply." The phrase "AC power supply" means an electric power supply producing alternating current.

3) "Driving Current In The Primary Winding" "Driving The Primary Winding Of The Transformer With A Current"

MKS contends that the phrases "driving current in the primary winding" and "driving the primary winding of the transformer with a current" used in independent claims 1, 19, 29, 42, and 44 of the patent in suit means "the power supply producing alternating current that drives current in the primary winding." (D.I. 103 at 6). MKS further contends that "[w]hether there is an electronic component between the power supply and the load is not relevant." (D.I. 103 at 30). Advanced Energy contends that the disputed phrases "do not include driving current through an impedance matching network." (D.I. 110 at 21-23).

With regard to these phrases, the parties' dispute centers on the absence or presence of an impedance matching network. As discussed previously, after reviewing the patent specification and prosecution history, the Court concludes that the invention was not intended to encompass an impedance matching network. (D.I. 111 A9 col. 2 ln. 22-26, A12 col. 7 ln. 49-60, A13 col. 10

ln. 19-21, A121-22, 124, A169-70). Accordingly, the phrases "driving current in the primary winding" and "driving the primary winding of the transformer with a current" mean the power supply producing alternating current that drives current in the primary winding and not through an impedance matching network.

4) "Coupled To"

MKS contends that the phrase "coupled to" in claim 1 and claim 24 means "connected in a fashion that allows for the transfer of power." (D.I. 103 at 28). Advanced Energy contends that the phrase "coupled to" cannot "be construed so as to include the use of an impedance matching network," that is, the term must be construed to mean directly connected to the primary winding, without intervening components. (D.I. 110 at 22).

Again, with regard to the term "coupled to," the parties' dispute centers on the absence or presence of an impedance matching network. As discussed previously, based on the patent specification and prosecution, the Court concludes that the invention was not intended to encompass an impedance matching network. (D.I. 111 A9 col. 2 ln. 22-26, A12 col. 7 ln. 49-60, A13 col. 10 ln. 19-21, A121-22, 124, A169-70). Accordingly, the term "coupled to" means connected, not through an impedance matching network, but in a fashion that allows for the transfer of power.

5) "Directly Coupled"

MKS contends that the term "directly coupled" in method claim 31 means "coupled via a relatively simple pathway versus a complex pathway; without undue complication of the circuit, in a non-circuitious pathway." (D.I. 103 at 33). Advanced Energy contends that the term means "connection with no circuitry or components between the switches and the primary winding." (D.I. 110 at 25).

In construing the term "directly coupled" the Court has reviewed the specification and the prosecution history. (See D.I. 111, A9 col. 2 ln. 21-67, A10 col. 3-4, A11 col. 5 ln. 1-21). Based upon a review of these sources, the Court concludes that the specification contains neither a definition of the term, nor a suggestion that the term should be assigned a meaning other than its ordinary and accustomed meaning. Accordingly, the Court construes the ordinary and accustomed meaning of "directly coupled" to be a connection with no circuitry or components between the switches and the primary winding.

6) "Electrically Connected"

MKS contends that the term "electrically connected" in Claim 19 means "coupled to the primary winding such that power is transferred by electrical current flow." (D.I. 103 at 32). Advanced Energy contends that the term cannot "be construed so as to include the use of an impedance matching network," that is,

the term must be construed to mean directly electrically connected to the primary winding, without intervening components. (D.I. 110 at 22).

Again, with regard to the term "electrically connected," the parties' dispute centers on the absence or presence of an impedance matching network. As previously discussed, based on the patent specification and prosecution, the Court concludes that the invention was not intended to encompass an impedance matching network. (D.I. 111 A9 col. 2 ln. 22-26, A12 col. 7 ln. 49-60, A13 col. 10 ln. 19-21, A121-22, 124, A169-70). Accordingly, the Court construes "electrically connected" to mean directly coupled to the primary winding, not through an impedance matching network, such that power is transferred by electrical current flow.

7) Preambles of the Claims

The preambles of the independent claims of the '628 Patent recite "an apparatus for dissociating gases" (claims 1 and 19), "a method for dissociating gases" (claim 29), "a method for cleaning a process chamber" (claim 42), and "a method for generating reactive gases" (claim 44). MKS contends that "[t]he description of the invention in the preamble is necessarily part of the scope of the invention described in the claims." (D.I. 103 at 36). Advanced Energy contends that none of these preamble

phrases are limitations of the respective claims. (D.I. 110 at 28).

Depending on the content, a preamble may serve a variety of purposes. In certain instances, the preamble may limit the scope of the claim, for example where the preamble contributes to the definition of the claimed invention. See e.g., Bell Communications Research, Inc. v. Vitalink Communications Corp., 55 F.3d 615 (Fed. Cir. 1995). However, "where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention, the preamble is not a claim limitation." STX, LLC v. Brine, Inc., 211 F.3d 533, 591 (Fed. Cir. 2000) (citations omitted). Such a preamble does not limit the scope of the claim "unless the preamble provides antecedents for ensuing claim terms and limits the claim accordingly." C.R.Bard, Inc. v. M3 Systems, Inc., 157 F.3d 1340, 1350 (Fed. Cir. 1998).

After reviewing the language of independent claims 14, 42, and 44, the Court concludes that the patentee defined a structurally complete invention in the claim bodies. (D.I. 104, Ex. A col. 11 ln. 34-59, col. 13 ln. 17-28, col. 14 ln. 1-26). Because the preamble states only the intended use for the invention, the preamble is not a limitation of claims 14, 42, and 44.

After reviewing the language of independent claims 1, 19, and 29, the Court concludes that the preamble contributes to the definition of the claimed invention. (D.I. 104, Ex. A col. 10 ln. 47-67, col. 11 ln. 1-33, 60-67, col. 12 ln. 1-67, col. 13 ln. 1-16). The preamble to claims 1 and 19 recites "an apparatus for dissociating gases;" similarly, the preamble to claim 29 recites "a method for dissociating gases." (D.I. 104, Ex. A col. 10 ln. 48, col. 11, ln.60, col. 12, ln. 33). A review of the patent and prosecution history reveals that the patent, as a whole, is directed toward dissociating gases. (See e.g. D.I. 104 Ex. A, "Abstract," col. 1 ln. 4-8, D.I. 111, A160-74). Therefore, the preamble language of claims 1, 19, and 29 is necessarily part of the scope of those independent claims; to hold otherwise disregard the context of the patent. See Corning Glass Works v. Sumitomo Elec., 868 F.2d 1251, 1257 (Fed. Cir. 1989).

8) "Plasma Chamber"

MKS contends that the term "plasma chamber" means "a structure that confines a plasma." (D.I. 103 at 7). MKS further contends that, in the context of the '628 Patent a "plasma chamber" must include "a means for ingress and egress of gases." (D.I. 118 at 21). Advanced Energy contends that the term "plasma chamber" means "a structure that contains or confines a plasma, and is of no specific shape." (D.I. 110 at 29).

In construing the term "plasma chamber," the Court has considered the patent specification and prosecution history. (See D.I. 104, Ex. A col. 2 ln. 46-54, col. 4 ln. 16-24, 35-44, Figure 3 (118), col. 9 ln. 28). Based on a review of these sources, the Court concludes that the context of the patent requires that a plasma chamber include a means for ingress and egress of gases. Accordingly, the Court construes the term "plasma chamber" to mean a structure, with a means for ingress and egress of gases, that contains a plasma.

9) "Reactive Gas"

MKS contends that the term "reactive gas" used in claims 13, 36, 37, 42, and 44 means "a gas that can rapidly take part in chemical reactions." (D.I. 103 at 36). Advanced Energy contends that the term "reactive gas" means "a gas having an ability to combine chemically with another substance." (D.I. 110 at 30).

With regard to the term "reactive gas," the parties' dispute centers on MKS' inclusion of the adverb "rapidly" to describe the rate at which a reactive gas can take part in a chemical reaction. In construing the term "reactive gas" the Court has considered the patent specification and prosecution history. (D.I. 104, Ex. A col. 8, ln. 3-5, col. 8 ln. 26-28). Based upon a review of these sources, the Court concludes that there is neither a definition of the term, nor a suggestion that the term should be assigned a meaning other than its ordinary and accustomed meaning. The Court concludes that the ordinary and

accustomed meaning does not include a description of the rate at which the reactive gas takes part in a chemical reaction. Accordingly, the Court construes the term "reactive gas" to mean a gas having an ability to combine chemically with another substance.

10) "Chemically Active Species"

MKS contends that the phrase "chemically active species" in claim 42 is "a subset of 'reactive gas' in the context of the '628 patent" and means "a species of reactive gas generated from the reactive gas in the plasma, that is itself chemically active." (D.I. 103 at 38). Advanced Energy contends that the phrase "chemically active species" means "a chemical entity in an energetically reactive state." (D.I. 110 at 30).

A review of the specification and prosecution history reveals that neither a definition of the "chemically active species," nor an example of the phrase has been offered. Further, a plain reading of claim 42, subsection (e) reveals that MKS' proposed construction, discussing the generation of the "chemically active species," is redundant. (See D.I. 104, Ex. A col. 14, ln. 5-7). Accordingly, the Court construes the phrase "chemically active species" to mean a chemical entity in an energetically reactive state.

11) Other Technical Terms

Because there is no material dispute as to the meaning of the following technical terms, the Court will adopt the

definitions proposed by the parties. (D.I. 103 at 38, D.I. 116). "Dissociating gases" means breaking up of molecular gases to form two or more atomic or molecular fragments. "Magnetic core" means a structure composed of material with enhanced permeability that is used to concentrate or enhance a magnetic field. "Primary winding" means a winding of the transformer to which power is applied. "Solid state" means utilizing the electric, magnetic, or optical properties of solid materials. "AC" is an acronym for alternating current, which is current that periodically reverses its direction of flow. "Inducing an AC potential inside the chamber that directly forms a toroidal plasma" means generation of a potential for AC current flow within the plasma chamber that directly powers the formation of a toroidal plasma in the plasma chamber. "Toroidal plasma" means a plasma in the form of a single-turn, closed path, such as an oval, circular or square donut. "Completes a secondary circuit of the transformer" means that the plasma serves as the secondary winding and load of the transformer. "Bus voltage supply" means supply of DC voltage used to power electronic circuits. "Dielectric material" means insulating material. "Process chamber ... coupled to the plasma chamber" means a physical connection between the plasma chamber and process chamber that allows gas flow. "Dielectric region that forms an electrical discontinuity in the chamber" means the insulating region that is placed between conductive regions of the plasma chamber that inhibits current conduction between the

electrically conductive regions. "Cooling channels" means passages on, about, or within the chamber for passing a fluid that controls the temperature of the chamber. "Initial ionization event" means an event that results in the initial ionization of gas in the chamber. "Noble gas" means a gas from Column VIII of the Periodic Table, including helium, neon, argon, xenon, radon, and krypton.

CONCLUSION

An appropriate Order will be entered.

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

APPLIED SCIENCE AND TECHNOLOGY, INC.,	:	
Plaintiff,	:	
v.	:	Civil Action No. 00-1004-JJF
ADVANCED ENERGY INDUSTRIES, INC.,	:	
Defendant.	:	

O R D E R

At Wilmington, this 26th day of April 2002, for the reasons set forth in the Memorandum Opinion issued this date, IT IS HEREBY ORDERED that:

1) The meaning of the term "AC switching power supply" is a power supply that uses switching devices to produce an AC output without using an impedance matching network.

2) The meaning of the term "AC power supply" is an electric power supply producing alternating current.

3) The meaning of the phrases "driving current in the primary winding" and "driving the primary winding of the transformer with a current" is the power supply producing alternating current that drives current in the primary winding and not through an impedance matching network.

4) The meaning of the term "coupled to" is connected, not through an impedance matching network, but in a fashion that allows for the transfer of power.

5) The meaning of the term "directly coupled" is a connection with no circuitry or components between the switches and the primary winding.

6) The meaning of the term "electrically connected" is directly coupled to the primary winding, not through an impedance matching network, such that power is transferred by electrical current flow.

7) The preamble to claims 14, 42, and 44 is not a limitation. The preamble to claims 1, 19, and 29 is a limitation of those independent claims.

8) The meaning of the term "plasma chamber" is a structure, with a means for ingress and egress of gases, that contains a plasma.

9) The meaning of the term "reactive gas" is a gas having an ability to combine chemically with another substance.

10) The meaning of the term "chemically active species" is a chemical entity in an energetically reactive state.

11) Pursuant to the parties' agreement, the Court adopts the definitions of certain technical terms. The meaning of the term "dissociating gases" is breaking up of molecular gases to form two or more atomic or molecular fragments. The meaning of the term "magnetic core" is a structure composed of material with enhanced permeability that is used to concentrate or enhance a magnetic field. The meaning of the term "primary winding" is a winding of the

transformer to which power is applied. The meaning of the term "solid state" is utilizing the electric, magnetic, or optical properties of solid materials. "AC" is an acronym for alternating current, which is current that periodically reverses its direction of flow. The meaning of the phrase "inducing an AC potential inside the chamber that directly forms a toroidal plasma" is generation of a potential for AC current flow within the plasma chamber that directly powers the formation of a toroidal plasma in the plasma chamber. The meaning of the term "toroidal plasma" is a plasma in the form of a single-turn, closed path, such as an oval, circular or square donut. The meaning of the phrase "completes a secondary circuit of the transformer" is that the plasma serves as the secondary winding and load of the transformer. The meaning of the phrase "bus voltage supply" is a supply of DC voltage used to power electronic circuits. The meaning of the term "dielectric material" is insulating material. The meaning of the phrase "process chamber ... coupled to the plasma chamber" is a physical connection between the plasma chamber and process chamber that allows gas flow. The meaning of the phrase "dielectric region that forms an electrical discontinuity in the chamber" is the insulating region that is placed between conductive

regions of the plasma chamber that inhibits current conduction between the electrically conductive regions. The meaning of the term "cooling channels" is passages on, about, or within the chamber for passing a fluid that controls the temperature of the chamber. The meaning of the phrase "initial ionization event" is an event that results in the initial ionization of gas in the chamber. The meaning of the term "Noble gas" is a gas from Column VIII of the Periodic Table, including helium, neon, argon, xenon, radon, and krypton.

JOSEPH J. FARNAN, JR.
UNITED STATES DISTRICT JUDGE